**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of: HECKMANN, et al. Docket: 2004DE106

Serial No.: 10/591,575 Group Art Unit: 1795

Filed: 11/29/2006 Examiner: Vajda, Peter L.

For: Violet Colorant For Colour Filters, Inks For Ink-Jet Electrophotographic Toners And Developers And E-Inks

**DECLARATION UNDER 37 CFR 1.132**

Mail Stop:
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I, Dr. Hans-Tobias Macholdt, state that I am a resident of D-64297 Darmstadt-Eberstadt, Federal Republic of Germany; that I am a citizen of the Federal Republic of Germany; that I am a chemist having graduated at the University of Darmstadt, Federal Republic of Germany; that I am one of the inventors of U.S. Patent Application Serial No. 10/591,575; for "Violet colorant for color filters, inks for ink-jet, electrophotographic toners and developers and e-inks." that I consider myself qualified, by my knowledge of chemistry, and especially of triphendioxazine pigments and color filters and by my 22 years experience in this field; that I can make the following observations and statements to wit:

This Declaration supplements my Declaration of October 20, 2010 and shall clarify the following aspects:

a. It is unclear to the examiner that the showing of a high contrast ratio of our inventive product composition ratio represents a showing of superior properties. It is also unclear to him how the contrast is measured.

It is not clear to the examiner why a contrast value of 1.3% of the state of the art is unsatisfactory for use in color filters.

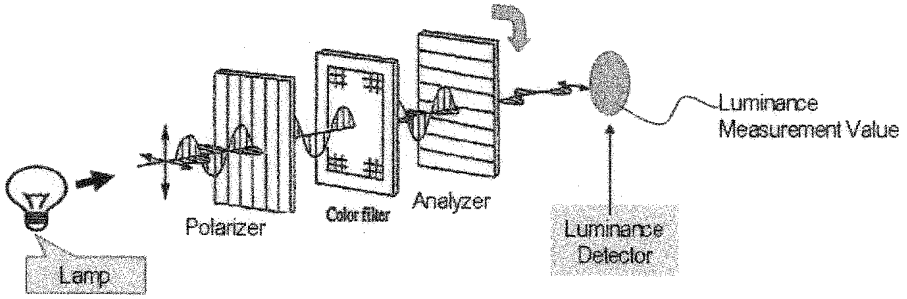
b. It is not clear to the examiner why the instantly measured contrast value is unexpected versus PV 23 alone.

Ad a).

Following explanation might help to understand the importance of high contrast ratio:

The contrast ratio is a property of a display system, defined as the ratio of the luminance of the brightest color (white) to that of the darkest color (black) that the system is capable of producing. A high contrast ratio is a desired aspect of any display since the picture quality increases with higher contrast ratio. Therefore the market for displays requests for constant improvements of contrast ratio.
Briefly said: The higher the contrast ratio – the better the display image.

Contrast measurement: In case of pigmented color filters for LC Displays, the measurement of contrast ratio is typically done as follows:
In a measurement device, the color filter, which is a pigmented coating layer on a glass substrate, is placed between two polarizers. Contrast ratio is then determined by measuring the light intensity after irradiation through the coatings layer.




One of the polarizer plates is rotatable and can be rotated by 90° (see figure). Thus the polarizer plates can be switched to be parallel (maximum luminance

position) or orthogonal to each other (minimum lumen position, "crossed polarizers", as shown in the figure).

Measurement procedure:

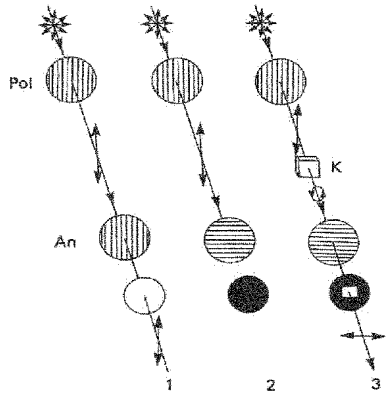
A first measurement of luminance is undertaken at parallel polarizers: Max lumen-value is obtained.

Then the analyzer is turned by 90° and a 2nd measurement of luminance is done at crossed polarizers, as shown in the picture: MinLumen value is obtained.

Contrast ratio CR is defined as $$CR = \frac{MaxLumen}{MinLumen},$$

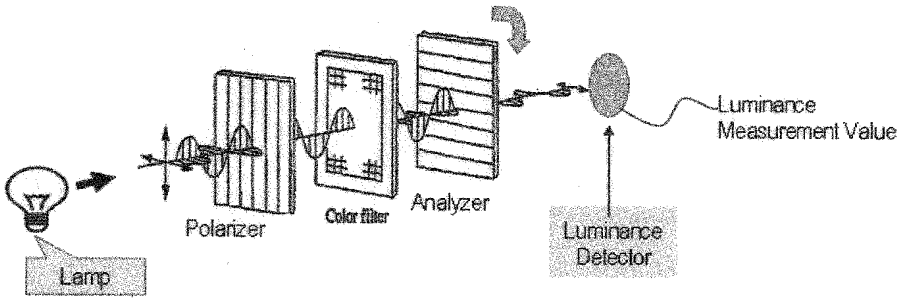
with MaxLumen = light at parallel polarizers and Min Lumen = Light at crossed polarizers.

In case of orthogonal position the analyzer ideally should absorb the complete light coming from the polarizer direction, thus luminance at crossed polarizers should be zero and no light would be detected behind the analyzer (case 2 below). Thus contrast ratio would be infinitely high.



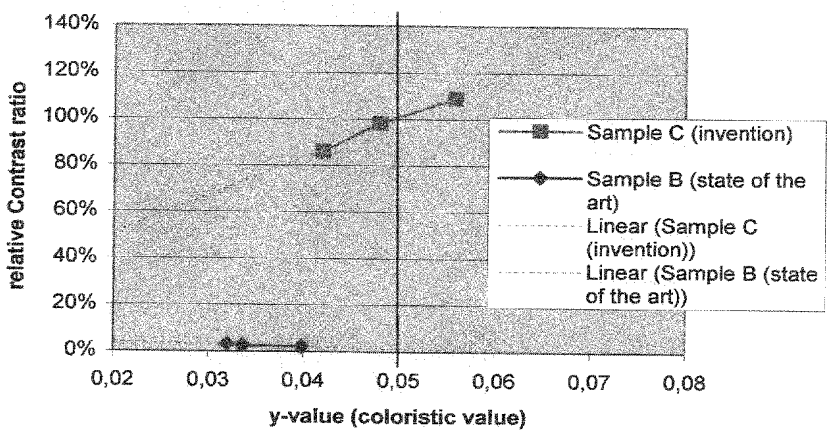

However, if a sample K (in this case a color filter) is brought between the polarizer plates, the sample typically influences the polarized light coming from the polarizer Pol. The polarized light is changed such that a small portion of light is depolarized and thus leaks through the analyzer. MinLumen in such a case is ≠ 0.

Compare also the image below:




Data analyis and determination of contrast at a given coloristic value:
In our case (when testing violet pigment samples), glass plates with violet lacquer films were used as test objects which were prepared as described in my Declaration of October 20, 2010.

In order to compare different samples of violet pigments, three glass plates of each violet dispersion were prepared by spin-coating, and the contrast ratio and corresponding y-(color)-coordinates of each glass plate were measured and registered in a chart such as the one below.
By linear extrapolation of the data and comparing the values at a y-value of y = 0.05, one can directly observe that sample C (inventive sample, relative contrast at y = 0.05 set to 100%) shows a significantly higher contrast ratio than the state-of the art-sample B. (relative contrast only 1.3%)




In other words: The inventive sample C has a contrast ratio which is approximately 77 times higher than the state of the art. Since higher contrast ratio results in an improved display image quality, sample C represents a significant technical advantage over the state of the art.

Ad b).

Why is such a high contrast ratio surprising:

As already mentioned in my Declaration of October 20, 2010, " color filters are manufactured using particularly finely divided pigments in order that particle scattering (i.e. light scattering), which leads to a reduction in contrast ratio, may be substantially foreclosed. "

Light scattering is an important mechanism that leads to a reduction of contrast ratio.

The intensity of light scattering is physically described by the Mie theory. This states that the intensity of light scattering increases with larger particle size. For the use of pigments for color filter it is therefore one important requirement that the particle size is very small.

As mentioned in my Declaration of October 20, 2010, the state-of-the-art comparison sample B showed a primary particle size d50 of 39 nm, which is finely divided.

As opposed to that the inventive sample C was measured to have a primary particle size d50= 47 nm.

Therefore it possessed larger particles and would be expected to show more light scattering and therefore lower contrast ratio.

However, the measuring results of contrast ratio surprisingly show the exact opposite trend as I had expected:

| Sample | D50 | Relative contrast ratio |
|---|---|---|
| Inventive sample C | 44 nm | 100% |
| State of the art, B | 39 nm | 1,3% |

In spite of its larger particles, the inventive composition of sample C is able to provide a 77 times higher contrast ratio than the state-of-the-art sample B. This behaviour was therefore unexpected and the use of compositions according to the invention in color filters shows a significant technical advantage.

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Frankfurt am Main,

Date: April 4, 2011

Hans-Tobias Macholdt